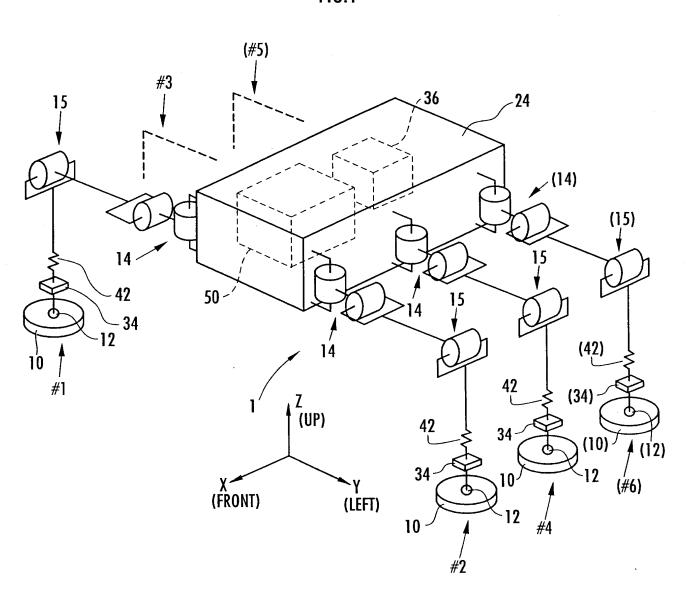
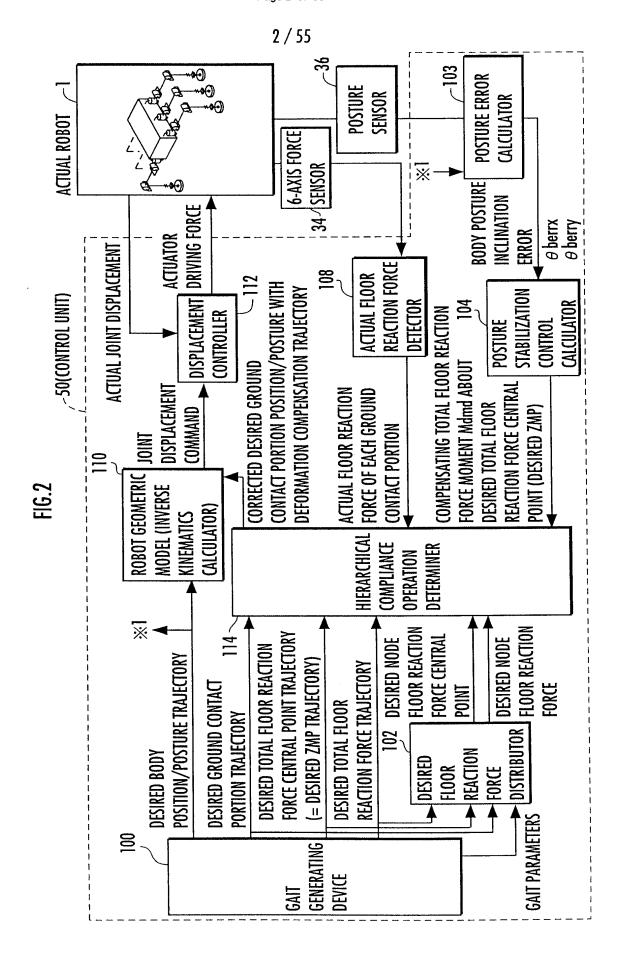
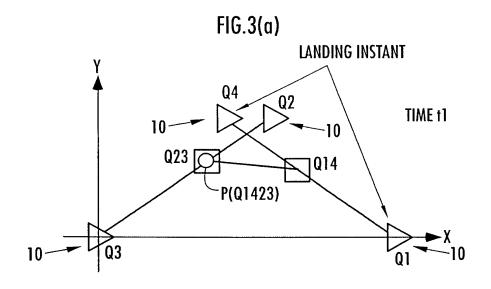
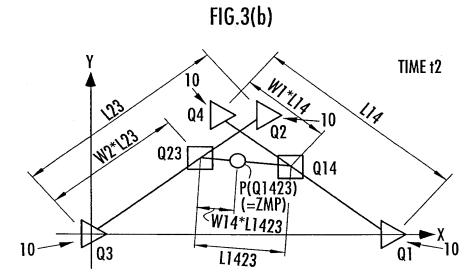
FIG.1

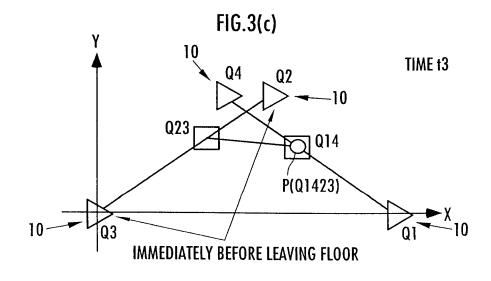




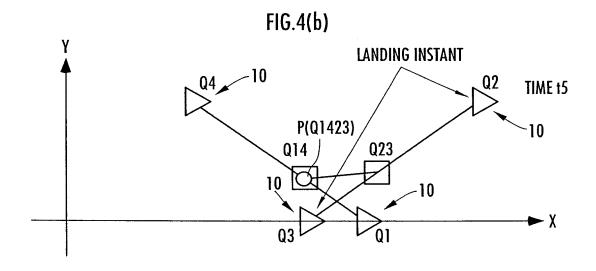
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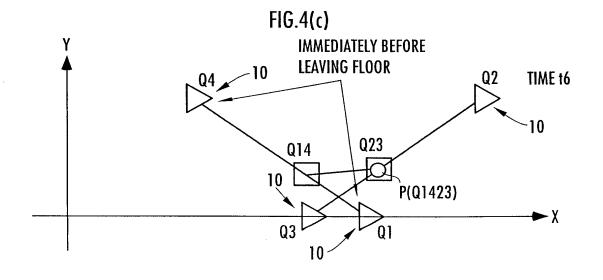


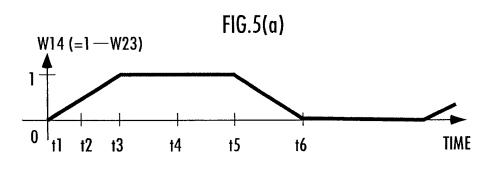


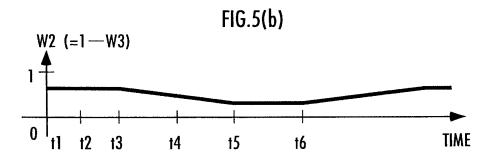


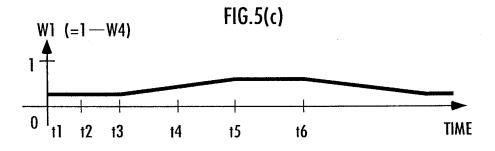
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First Named Inventor: Toru Takenaka
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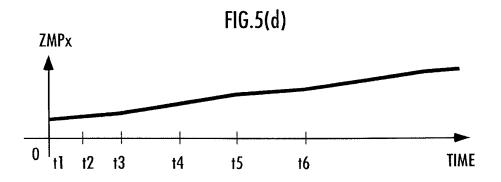




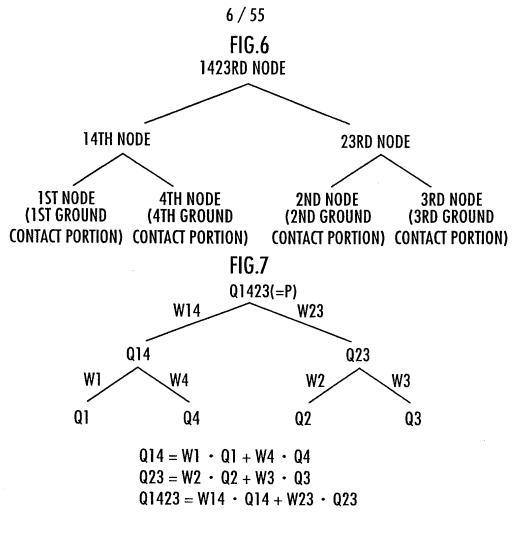


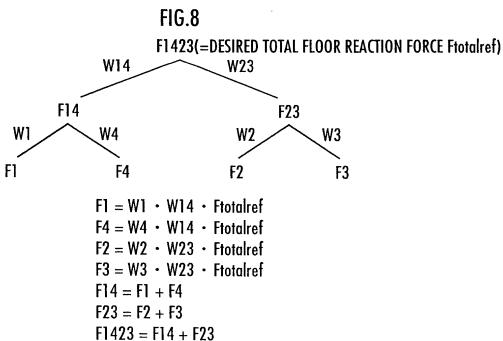




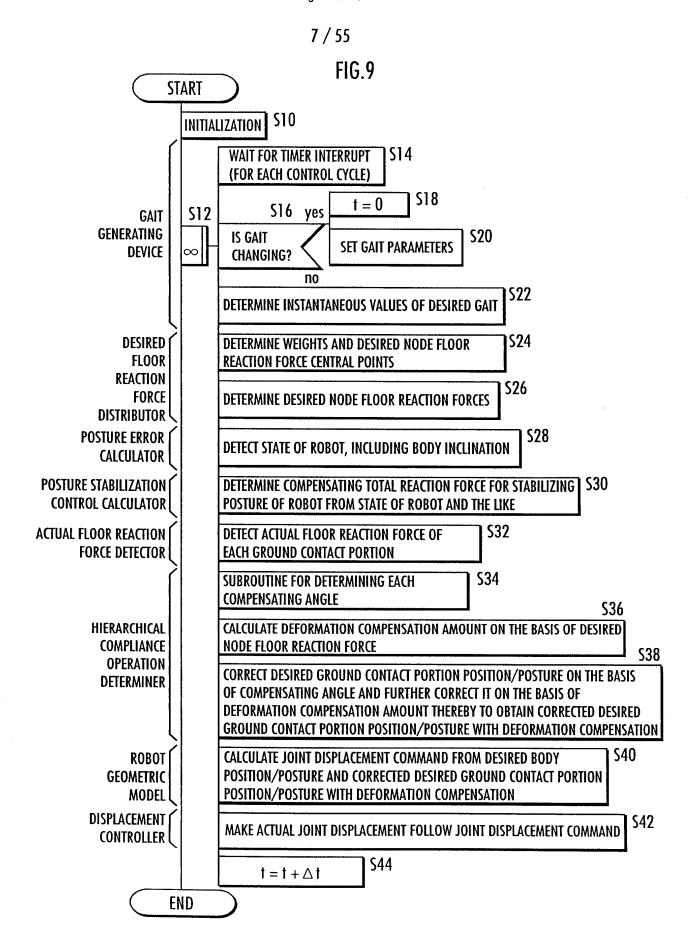


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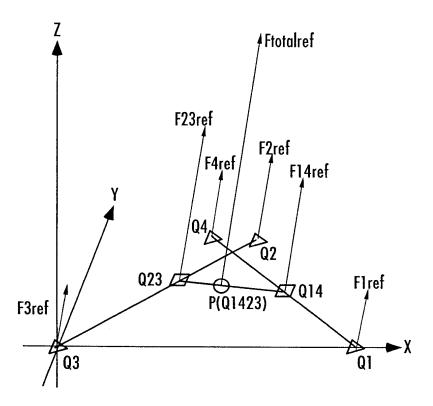
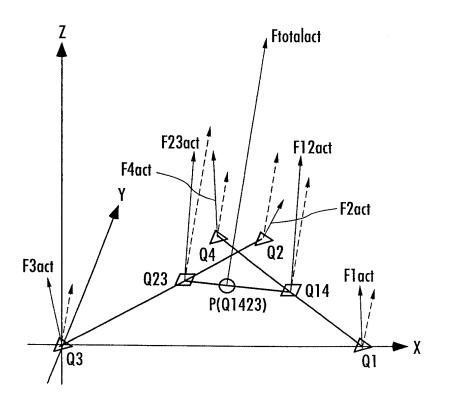
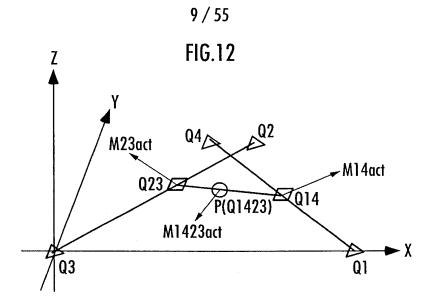
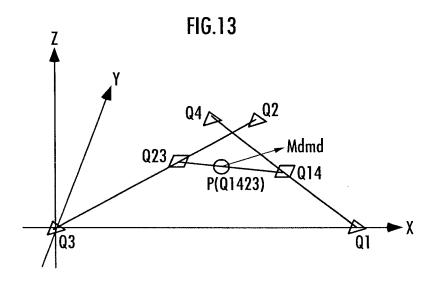


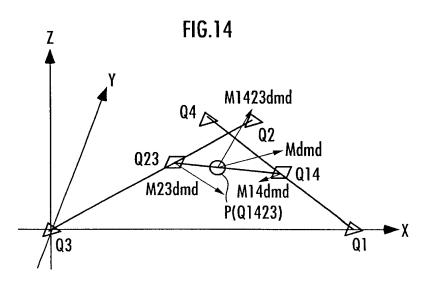
FIG.11



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FIG.15

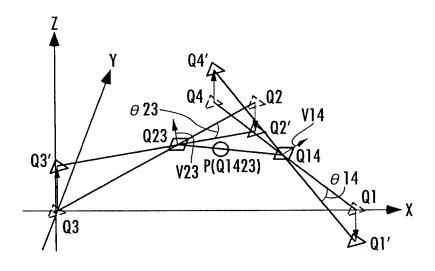
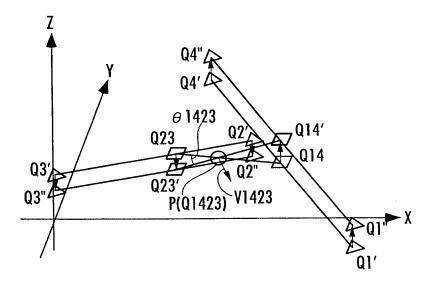


FIG.16



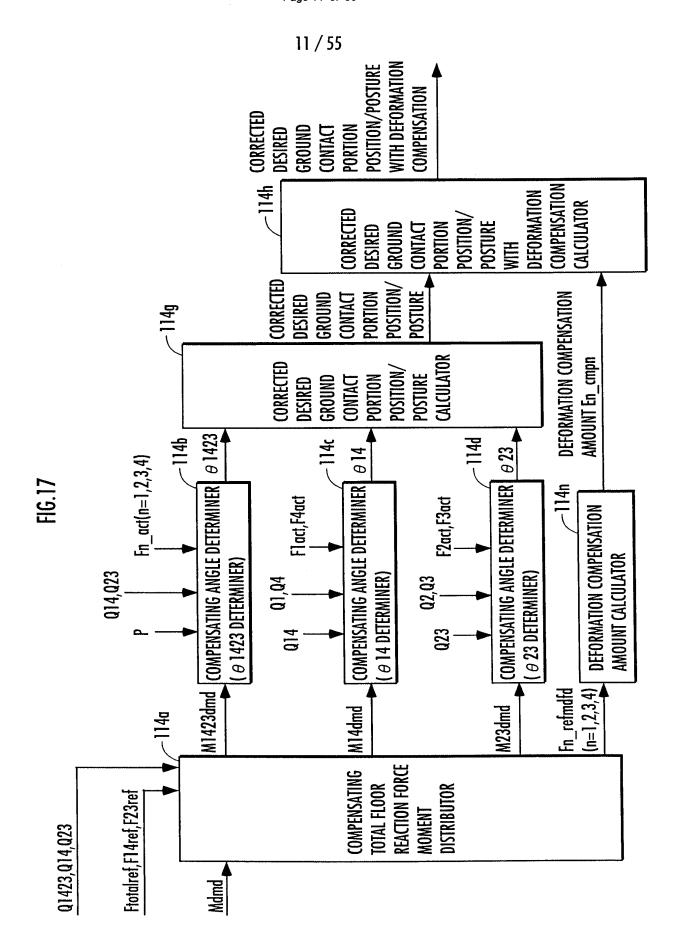
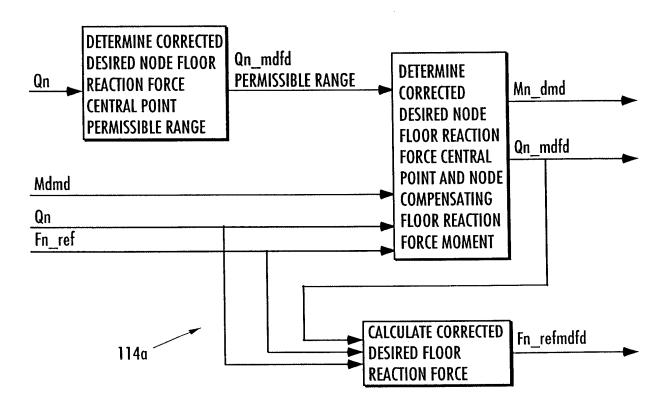
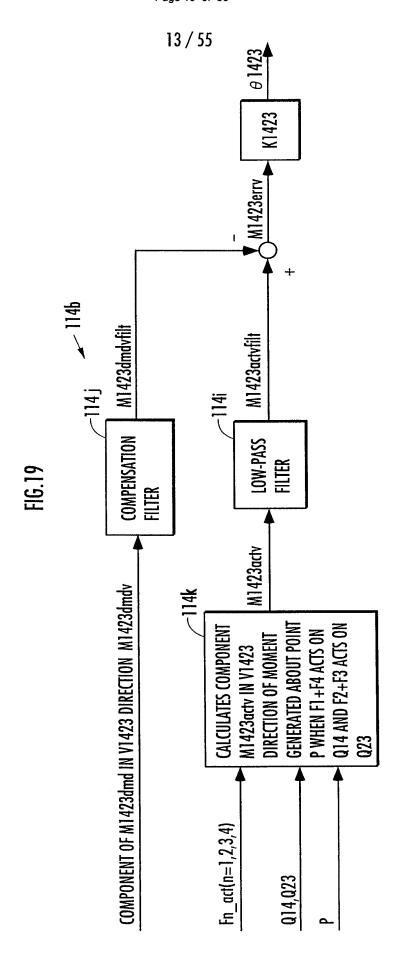
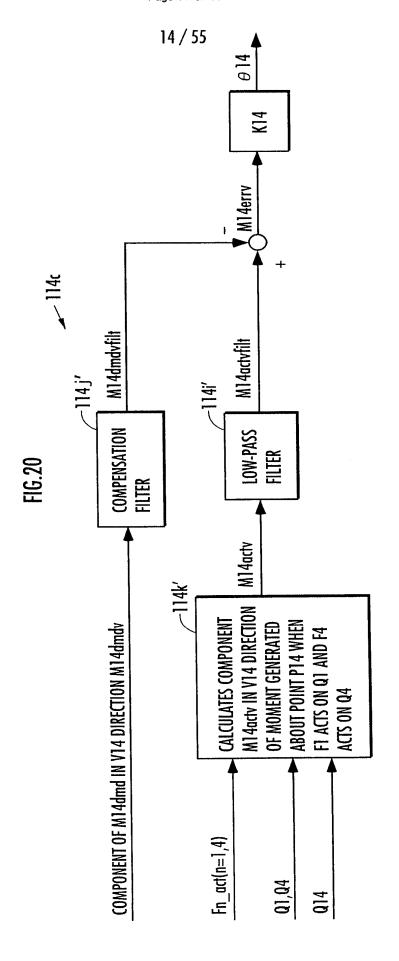


FIG.18

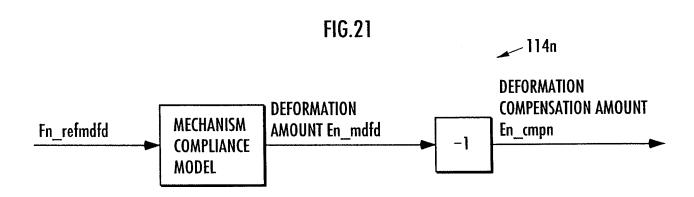




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FIG.22

ENTRY

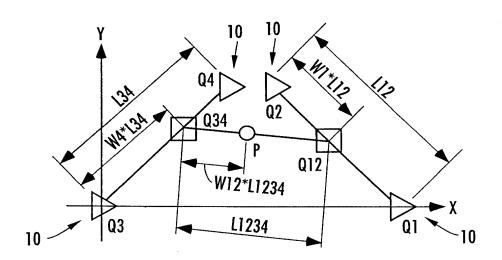
\$100 CALCULATE ACTUAL n-TH NODE FLOOR REACTION FORCE Fn act(n=1,2,3,4,14,23,1423) ON THE BASIS OF ACTUAL FLOOR REACTION FORCE OF EACH GROUND CONTACT PORTION **S102** CALCULATE ACTUAL n-TH NODE FLOOR REACTION FORCE MOMENT Mn_act(n=1,2,3,4,14,23,1423) **S104** DETERMINE n-TH NODE COMPENSATING FLOOR REACTION FORCE MOMENT Mn_dmd(n=14,23,1423) ON THE BASIS OF COMPENSATING TOTAL FLOOR REACTION FORCE MOMENT **S106** DETERMINE VECTORS V1423,V14,V23 AND VECTORS U1423,U14,U23 ORTHOGONAL THERETO, AS DEFINED IN HIERARCHICAL COMPLIANCE OPERATION **S108** EXTRACT COMPONENT IN Vn DIRECTION Mn_actv AND COMPONENT IN Un DIRECTION Mn actu OF ACTUAL n-TH NODE FLOOR REACTION FORCE MOMENT (n=14,23,1423) **S110** EXTRACT COMPONENT IN Vn DIRECTION Mn dmdv AND COMPONENT IN Un DIRECTION Mn dmdu OF n-TH NODE COMPENSATING FLOOR REACTION FORCE MOMENT Mn dmd(n=14,23,1423) **S112** DETERMINE V COMPONENT OF n-TH NODE COMPENSATING ANGLE BY MULTIPLYING DIFFERENCE BETWEEN VALUE OBTAINED BY PASSING Mn actv THROUGH FILTER AND VALUE OBTAINED BY PASSING Mn dmdv THROUGH FILTER BY GAIN Kn **S114** DETERMINE U COMPONENT OF n-TH NODE COMPENSATING ANGLE BY MULTIPLYING DIFFERENCE BETWEEN VALUE OBTAINED BY PASSING Mn actu THROUGH FILTER AND VALUE OBTAINED BY PASSING Mn dmdu THROUGH FILTER BY GAIN Kn

RETURN

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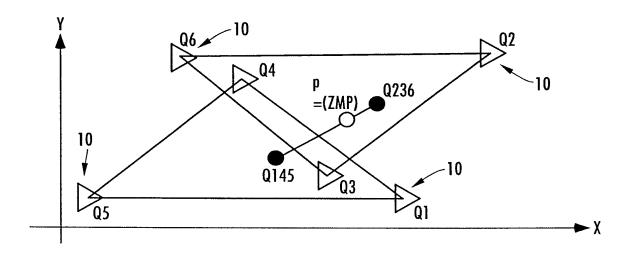
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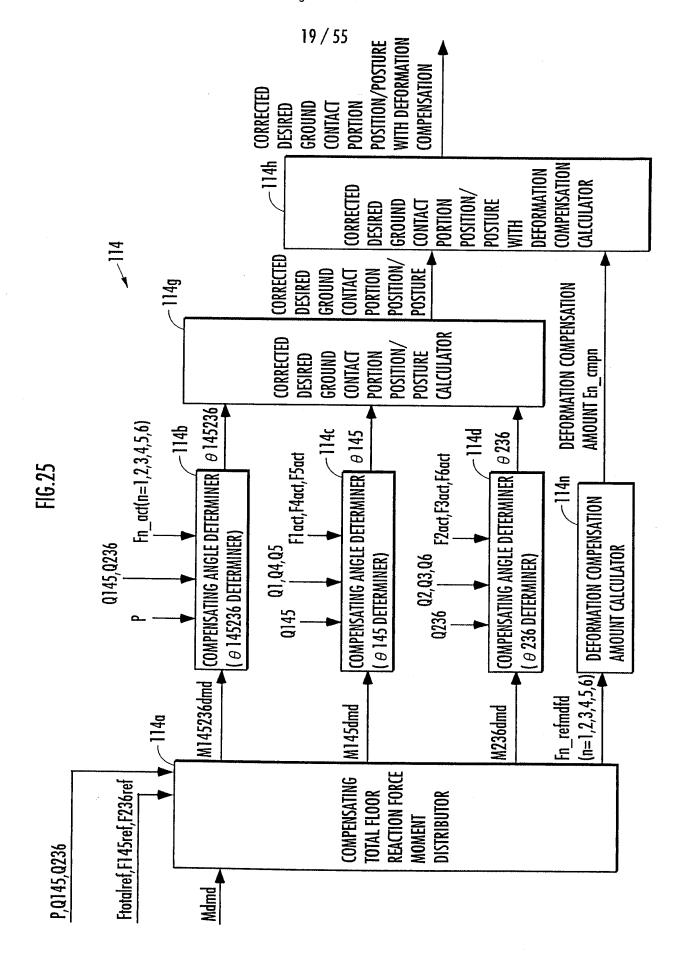
FIG.23



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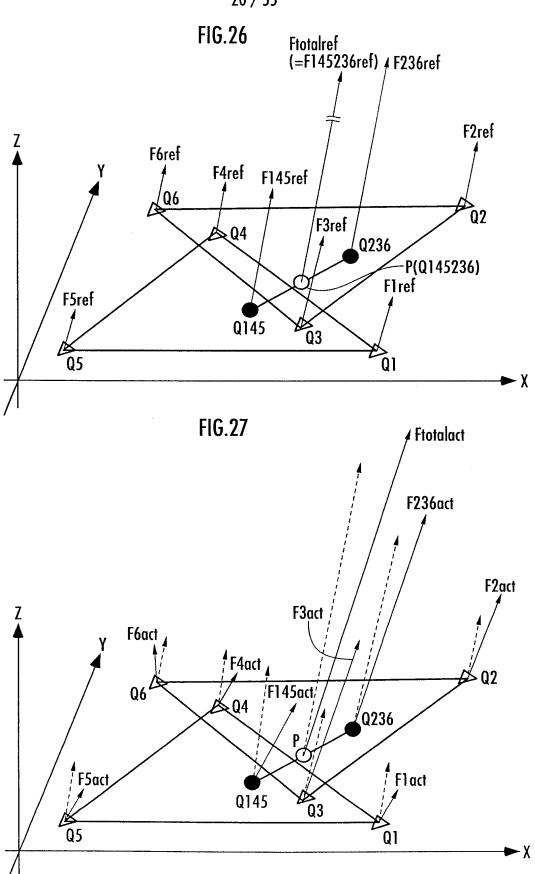
FIG.24





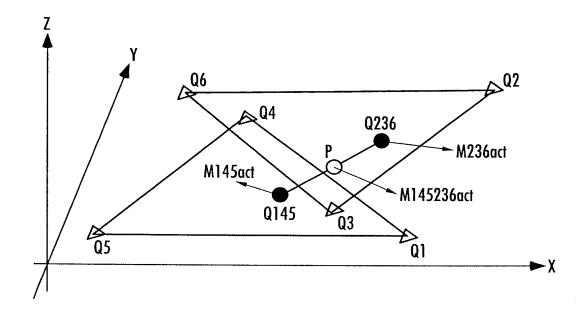
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FIG.28



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FIG.29(a)

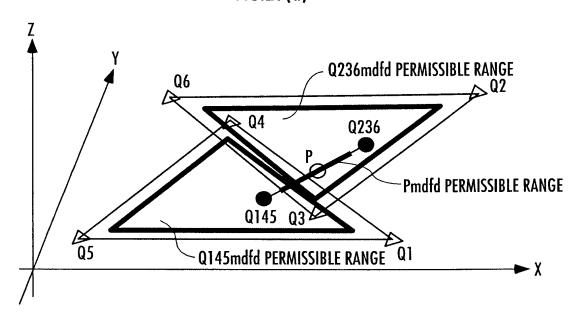
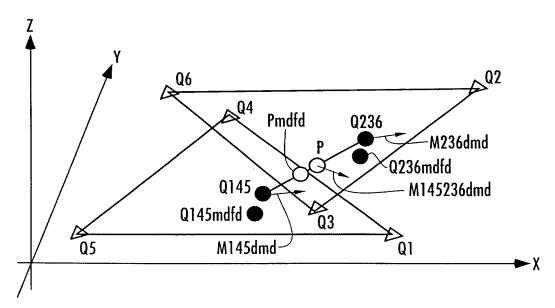


FIG.29(b)



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FIG.30

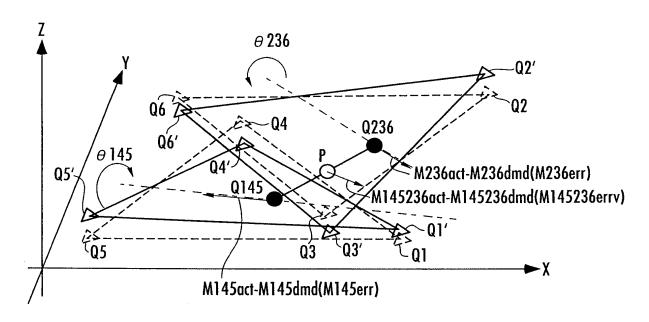
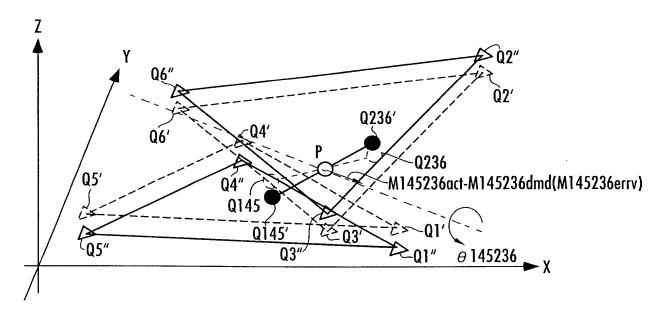
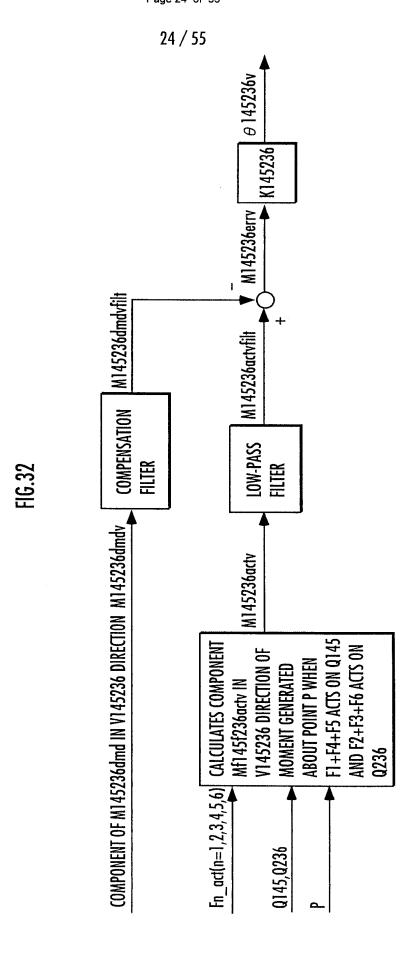
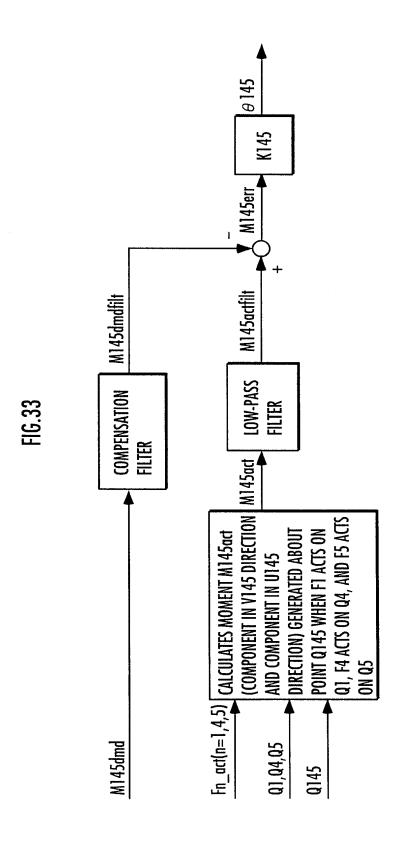


FIG.31



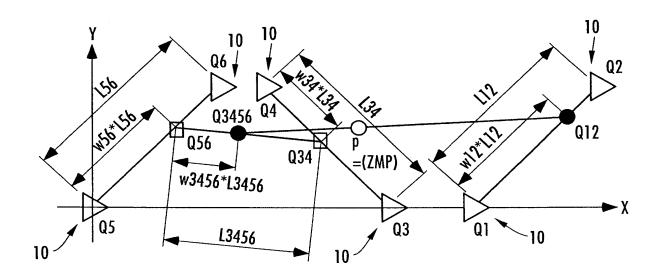


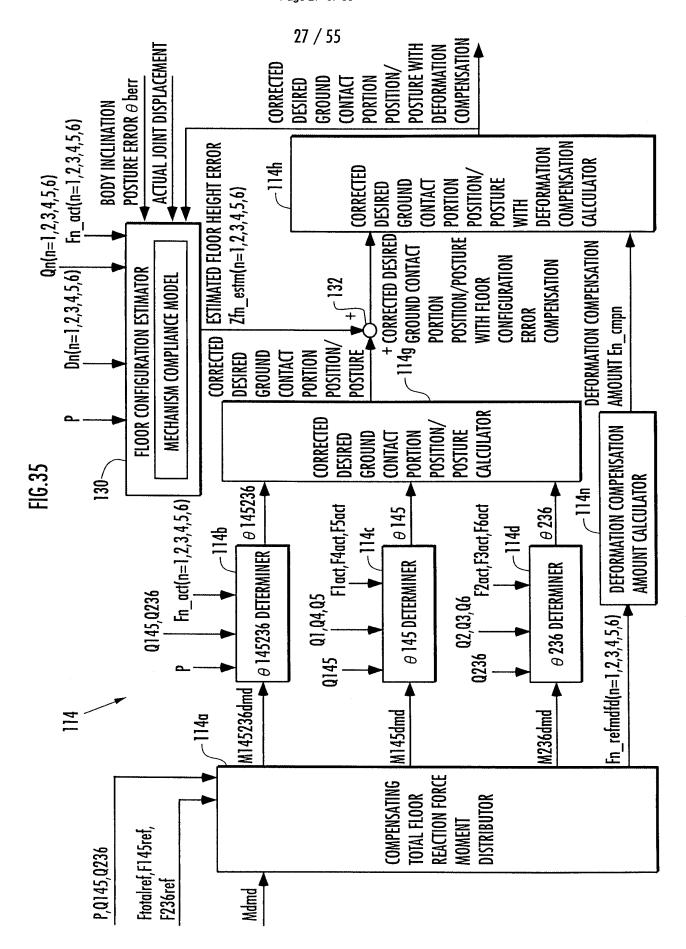
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FIG.34





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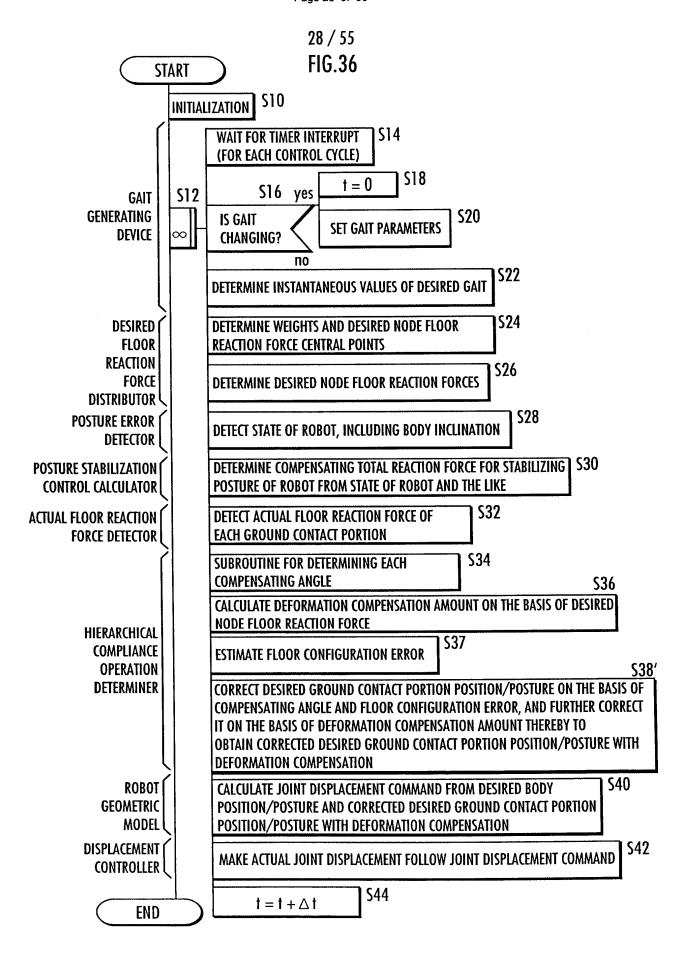


FIG.37

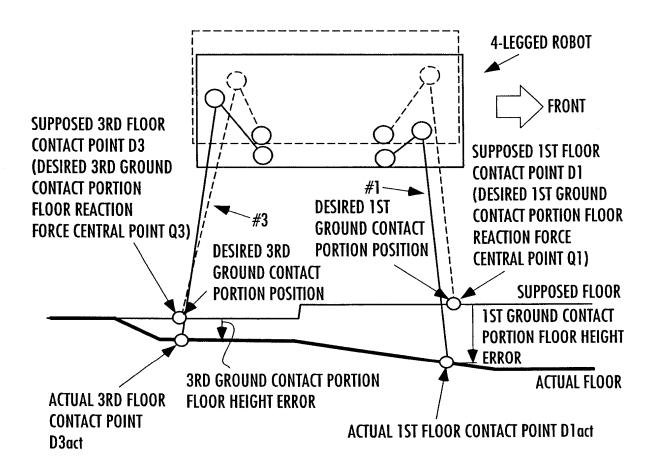
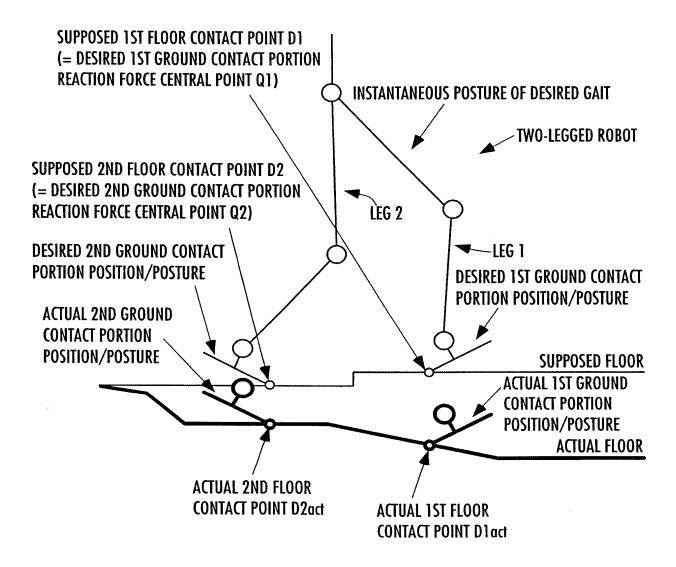


FIG.38



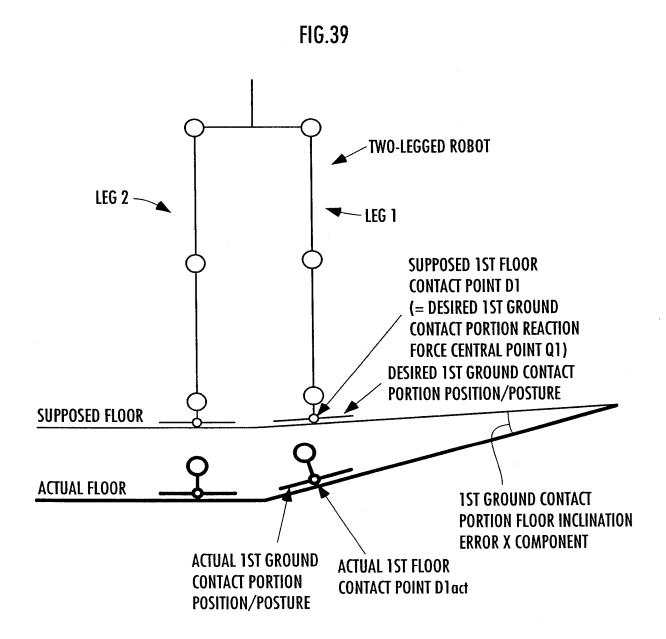
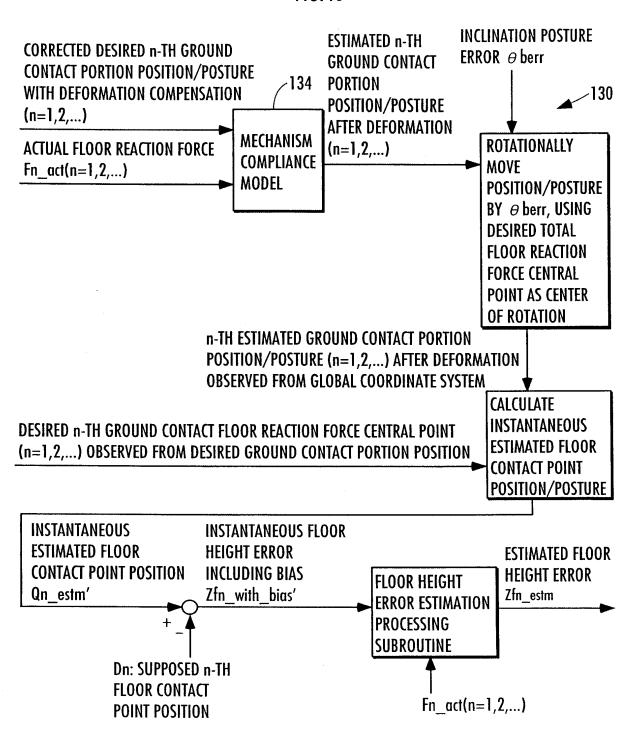


FIG.40



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FIG.41

ENTRY

S50 HIERARCHICALLY RELATIVIZE BIAS-INCLUDED INSTANTANEOUS n-TH GROUND CONTACT PORTION FLOOR HEIGHT ERROR Zfn_with bigs' TO DETERMINE INSTANTANEOUS n-TH NODE RELATIVE FLOOR HEIGHT ERROR Zn rel'

S52

HIERARCHICALLY RELATIVIZE ESTIMATED n-TH GROUND CONTACT PORTION FLOOR HEIGHT ERROR Zfn_estm_p, WHICH HAS BEEN DETERMINED AT LAST CONTROL CYCLE, BY USING CURRENT WEIGHT TO DETERMINE LAST ESTIMATED n-TH NODE RELATIVE FLOOR HEIGHT ERROR Zn rel estm p

S54 Zn_inc_cand = (Zn_rel'-Zn rel estm p) * $\triangle T / (Testm + \triangle T)$

DETERMINE NODE REQUEST MODE OF EACH NODE ON THE BASIS OF TIMING OF DESIRED GAIT

S56

=2

=3

=0

DETERMINE EACH NODE MODE ON THE BASIS OF NODE REQUEST MODE AND RESULT OF **DETERMINATION OF WHETHER ESTIMATION PERMITTING CONDITION IS SATISFIED**

S62

S64

S58

S60 n=1,2,...LAST NODE NUMBER NUMBER OF CHILD NODES OF n-TH NODE=?

2 CHILD NODES **FLOOR CONFIGURATION ESTIMATION PROCESSING FOR 3 CHILD NODES**

Yes

ESTIMATION PROCESSING FOR

FLOOR CONFIGURATION

S70

S66

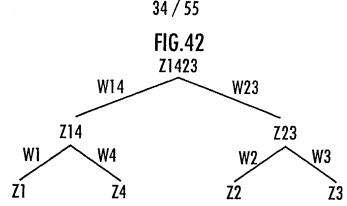
S68 IS IT POSSIBLE TO GENERATE MOMENT?

GROUND CONTACT PORTION FLOOR INCLINATION **ERROR ESTIMATION PROCESSING**

DETERMINE SUM OF ESTIMATED RELATIVE FLOOR HEIGHT ERRORS OF ALL ANCESTOR NODES OF n-TH NODE (n=1,2,...LAST LEAF NODE NUMBER) AND ESTIMATED n-TH NODE RELATIVE FLOOR HEIGHT ERROR, AND DEFINE THE DETERMINED SUM AS ESTIMATED n-TH GROUND CONTACT PORTION FLOOR HEIGHT ERROR Zfn estm

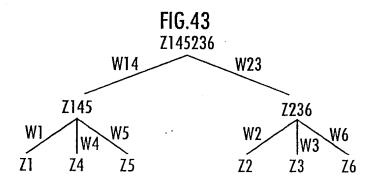
S72

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Z14_with_bias = W1 • Z1_with_bias + W4 • Z4_with_bias
Z23_with_bias = W2 • Z2_with_bias + W3 • Z3_with_bias
Z1423_with_bias = W14 • Z14_with_bias + W23 • Z23_with_bias

Z1_rel = Z1_with_bias - Z14_with_bias
Z4_rel = Z4_with_bias - Z14_with_bias
Z2_rel = Z2_with_bias - Z23_with_bias
Z3_rel = Z3_with_bias - Z23_with_bias
Z14_rel = Z14_with_bias - Z1423_with_bias
Z23_rel = Z23_with_bias - Z1423_with_bias



Z145_with_bias = W1 · Z1_with_bias + W4 · Z4_with_bias + W5 · Z5_with_bias Z236_with_bias = W2 · Z2_with_bias + W3 · Z3_with_bias + W6 · Z6_with_bias Z145236_with_bias = W145 · Z145_with_bias + W236 · Z236_with_bias

Z1_rel = Z1_with_bias - Z145_with_bias
Z4_rel = Z4_with_bias - Z145_with_bias
Z5_rel = Z5_with_bias - Z145_with_bias
Z2_rel = Z2_with_bias - Z236_with_bias
Z3_rel = Z3_with_bias - Z236_with_bias
Z6_rel = Z6_with_bias - Z236_with_bias
Z145_rel = Z145_with_bias - Z145236_with_bias
Z236_rel = Z236_with_bias - Z145236_with_bias

FIG.44

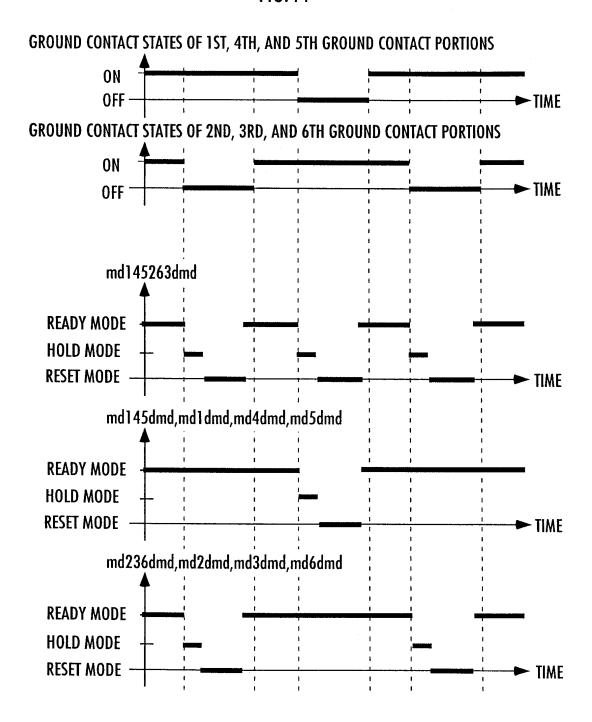
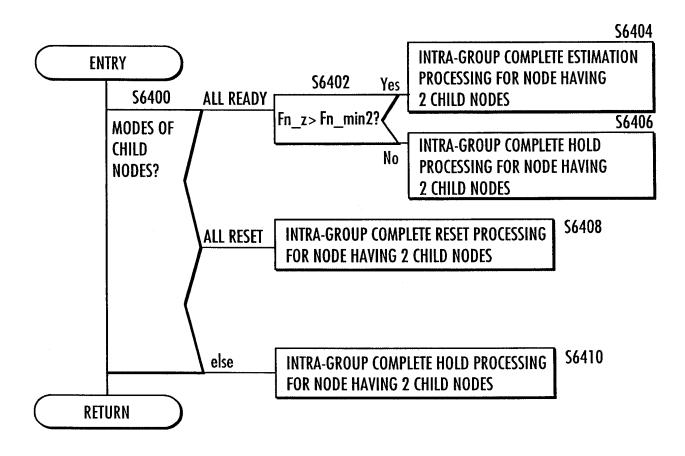
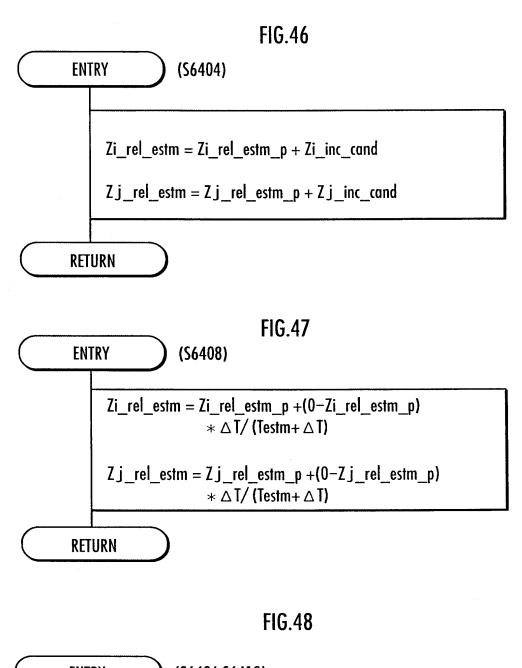


FIG.45





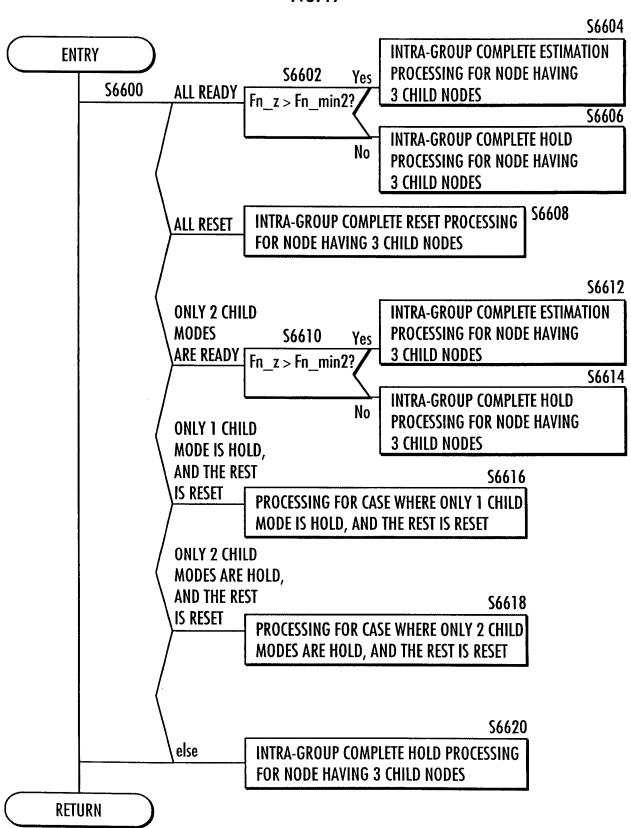
Zi_rel_estm = Zi_rel_estm_p

Zj_rel_estm = Zj_rel_estm_p

RETURN

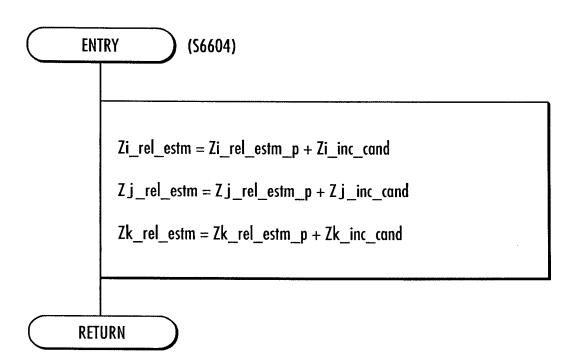
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FIG.49



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FIG.51

ENTRY

(\$6608)

$$Zi_rel_estm = Zi_rel_estm_p + (0 - Zi_rel_estm_p)$$

$$* \triangle T/(Testm + \triangle T)$$

$$Zj_rel_estm = Zj_rel_estm_p + (0 - Zj_rel_estm_p)$$

 $* \Delta T/(Testm + \Delta T)$

$$Zk_rel_estm = Zk_rel_estm_p + (0 - Zk_rel_estm_p) \\ * \triangle T/(Testm + \triangle T)$$

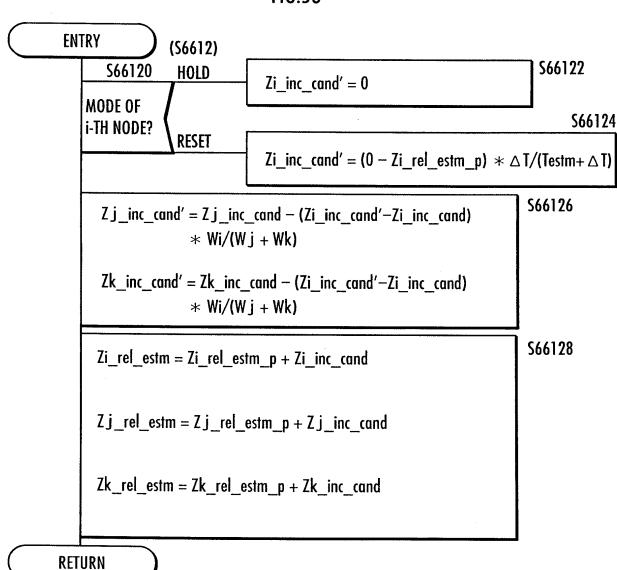
RETURN

FIG.52

ENTRY

(\$6606,\$6614,\$6620)

RETURN



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FIG.54

ENTRY

(\$6616)

$$Zi_rel_estm = 0$$

$$Z_j_rel_estm = Z_j_rel_estm_p + (0 - Z_j_rel_estm_p)$$

 $* \triangle T/(Testm + \triangle T)$

RETURN

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FIG.55

ENTRY (S6618)

Zi_rel_estm = Zi_rel_estm_p

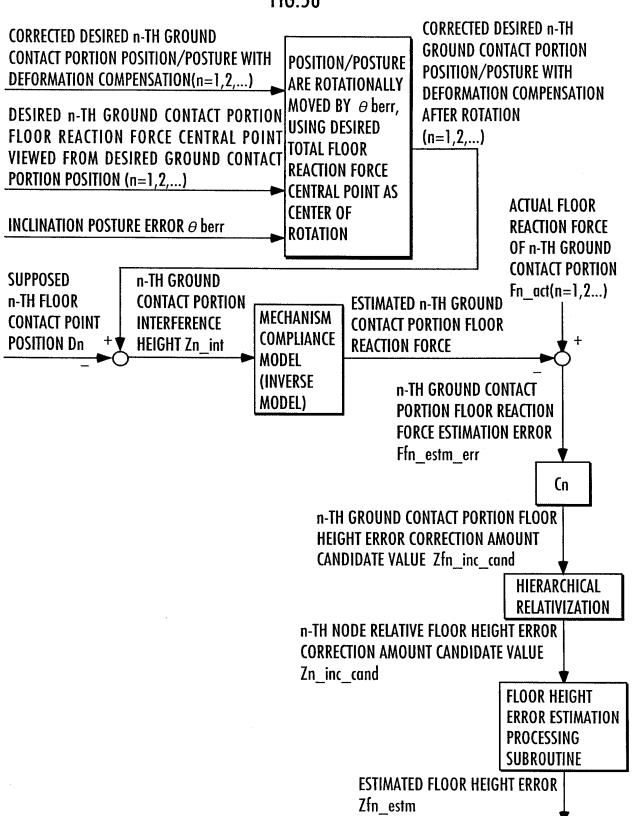
Zj_rel_estm = Zj_rel_estm_p

 $Zk_rel_estm = Zk_rel_estm_p + (0 - Zk_rel_estm_p)$ $* \Delta T/(Testm + \Delta T)$

RETURN

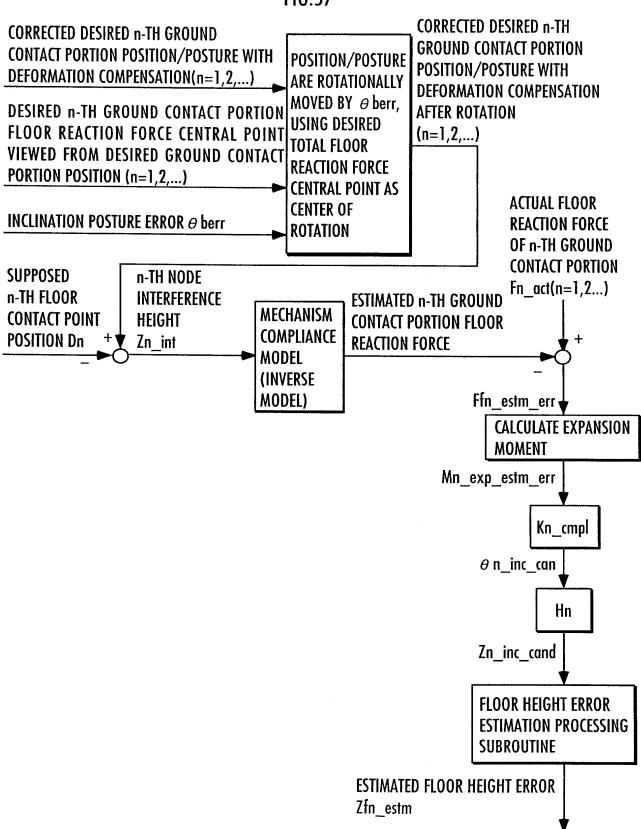
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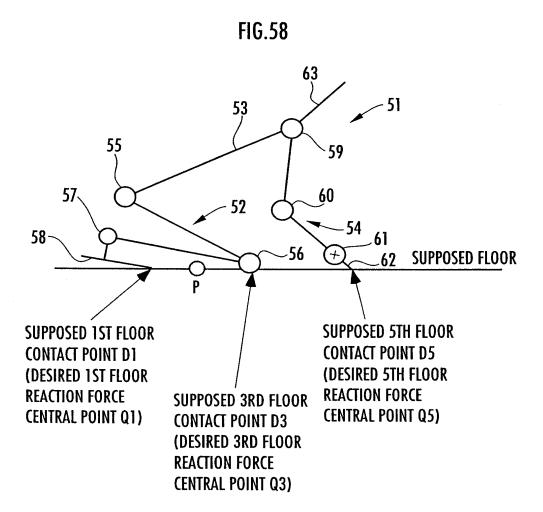
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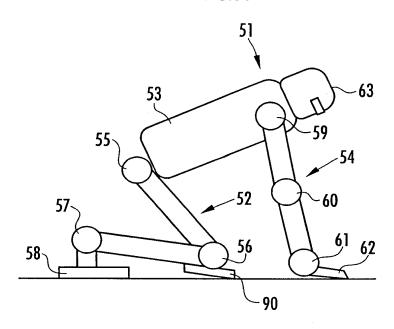




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FIG.59



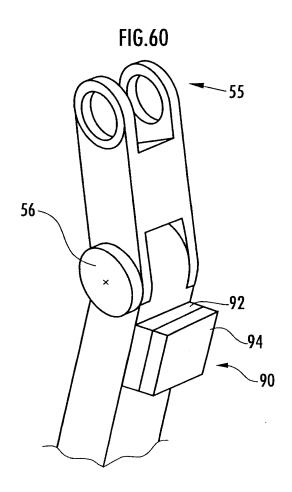
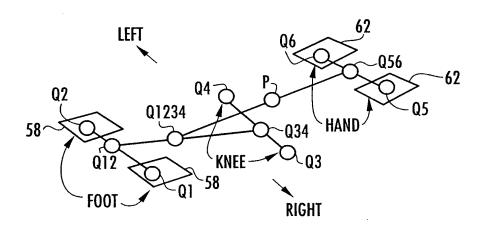
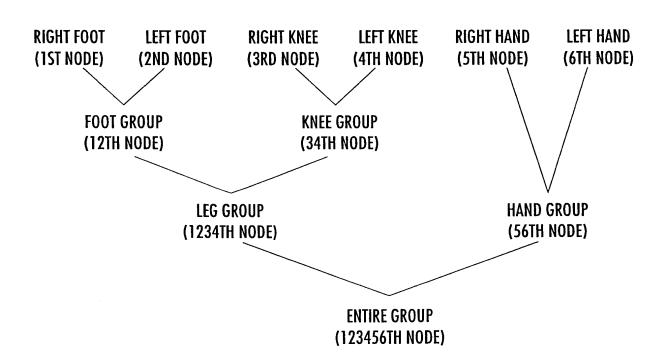
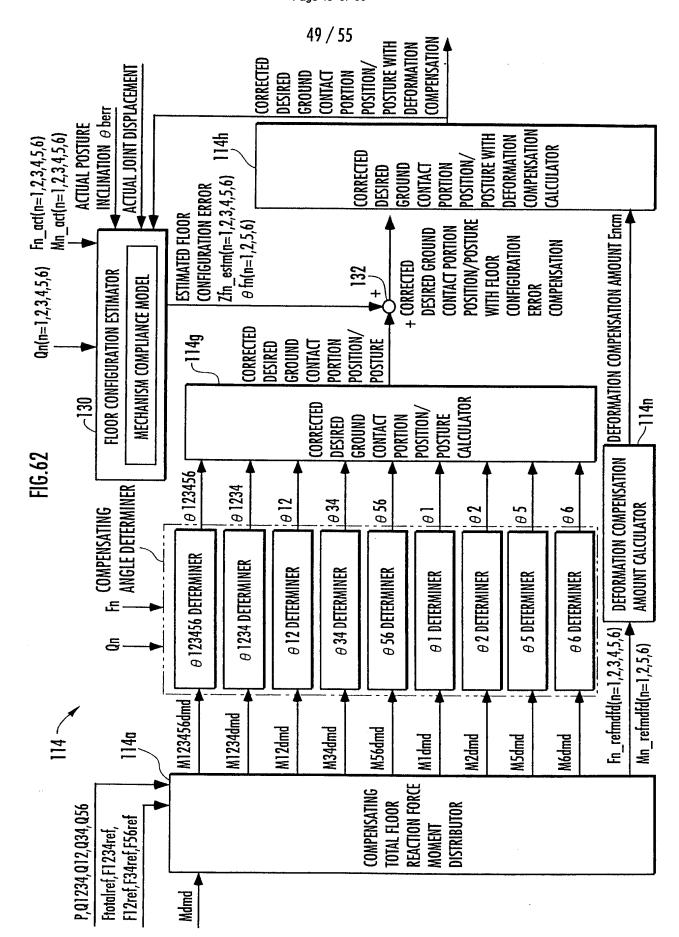


FIG.61

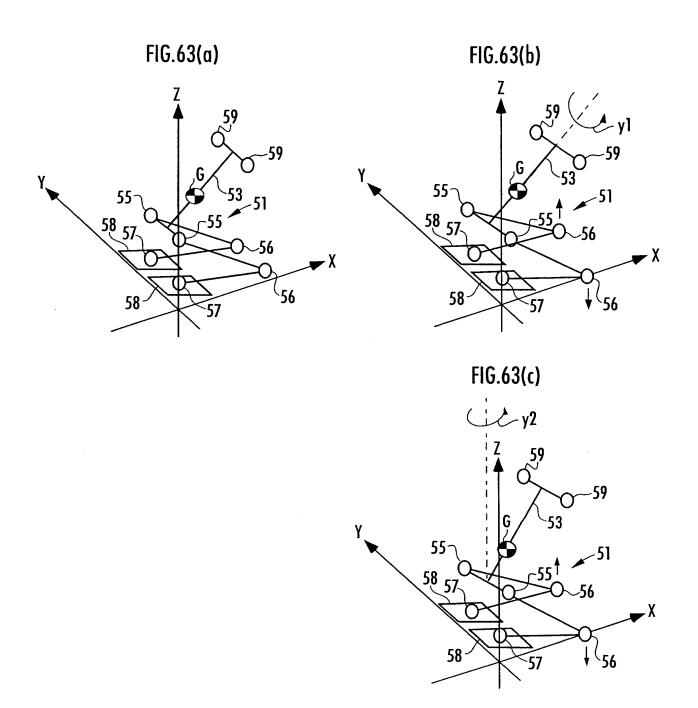




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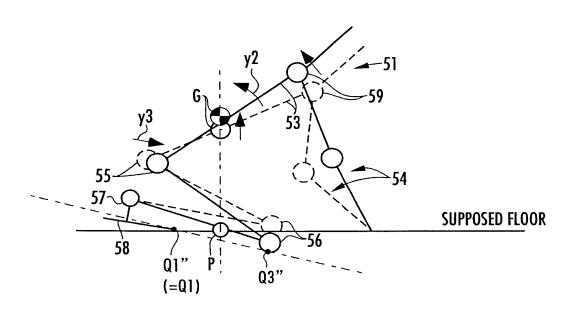


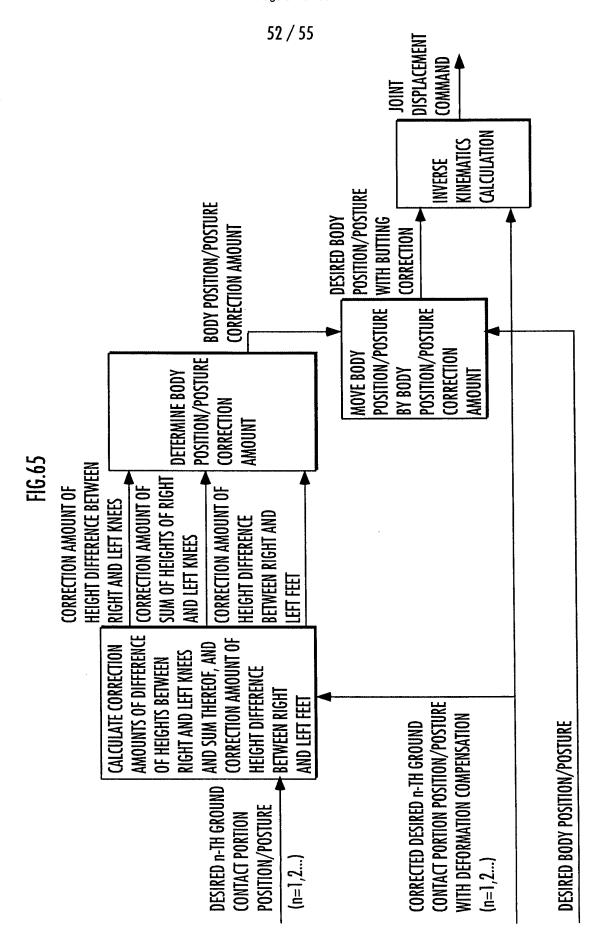
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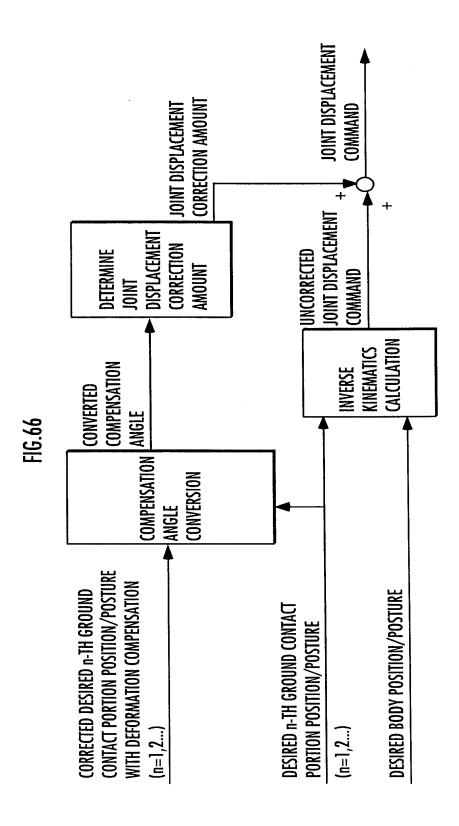
Title: "CONTROL DEVICE FOR MOBILE BODY" First Named Inventor: Toru Takenaka National Stage of PCT/JP2004/018089 Customer No. 40854; Docket No. SAT-16667 Page 51 of 55

FIG.64

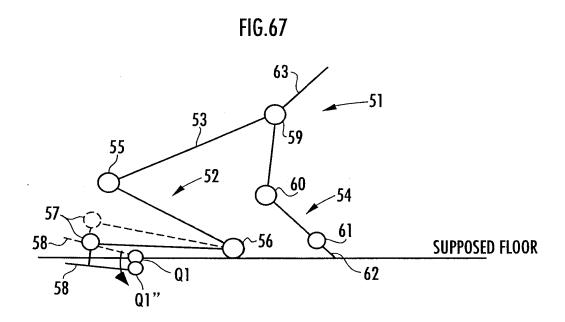


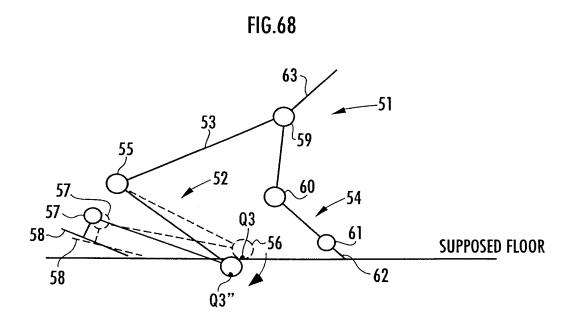


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